

UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF TENNESSEE  
AT KNOXVILLE

|                                   |   |                  |
|-----------------------------------|---|------------------|
| ROBERT ALAN CHRISTIE, II,         | ) |                  |
|                                   | ) |                  |
| Plaintiff,                        | ) |                  |
|                                   | ) |                  |
| v.                                | ) | No. 3:04-CV-280  |
|                                   | ) | (VARLAN/SHIRLEY) |
| MAZDA MOTOR OF AMERICA, INC., and | ) |                  |
| MAZDA MOTOR CORPORATION,          | ) |                  |
|                                   | ) |                  |
| Defendants.                       | ) |                  |

**MEMORANDUM AND ORDER**

This case is before the undersigned pursuant to 28 U.S.C. § 636(b), the Rules of this Court, and by Order [Doc. 66] of the Honorable Thomas A. Varlan, United States District Judge, for disposition of Defendants’ Motion in Limine to Exclude the Testimony of Plaintiff’s Proposed Expert, Dr. Charles Benedict [Doc. 44] pursuant to Rule 702 of the Federal Rules of Evidence and Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993). The undersigned conducted a Daubert hearing on July 10, 2006. Dr. Benedict was present as the only witness at the Daubert hearing.

**I. BACKGROUND**

The plaintiff Robert Alan Christie, II (“Christie”) brings this action against the defendants Mazda Motor of America, Inc. and Mazda Motor Corporation (collectively “Mazda”) for damages arising from injuries he sustained in a collision with another vehicle on July 31, 2002.

Christie alleges that the 1995 Mazda Miata he was driving was defective in that its “occupant protection system, supplemental restraint system and seat system were in a defective or unreasonably dangerous condition . . . .” [Complaint ¶ 10].

Christie has retained Dr. Charles Benedict as a trial expert regarding alleged defects in the vehicle. Dr. Benedict is a licensed professional engineer, who has extensive experience in vehicle accident reconstruction, product design, and failure analysis, including vehicle restraint systems. [Benedict Aff. ¶¶ 3-8]. He is the president and majority shareholder of Benedict Engineering Company. [Benedict Dep. at 6-7].

In his first report dated February 26, 2004, Dr. Benedict stated the following opinions: (1) the structural integrity of the hood is inherently defective and unreasonably dangerous because it penetrated the windshield in violation of Federal Motor Vehicle Safety Standards (“FMVSS”) 219; (2) the airbag is inherently defective and unreasonably dangerous in that it failed to protect Christie from the severe forces applied to his head as a result of impact; and (3) the restraint system is inherently defective and unreasonably dangerous in that it failed to properly restrain Christie and prevent him from striking his head on the interior components of the vehicle. With respect to this last opinion, Dr. Benedict specifically opined that the restraint system is defective and unreasonably dangerous because the seat buckle inertially unlatched during the collision. [Doc. 44 Ex. 2].

On November 15, 2005, Dr. Benedict submitted a supplemental report based on additional information regarding the condition of the restraint system at the time that EMT personnel removed Christie from the vehicle. Specifically, Carver Lovely, one of the EMT personnel on site who assisted in removing Christie from the vehicle, testified that there was a seat belt restraining

Christie, but that he could not remember whether the belt buckle was still latched or if the belt was just hooked around Christie's clothing. Based upon these additional details, as well as additional testing that Dr. Benedict performed, Dr. Benedict additionally opined that the seat belt retractor failed to lock in accordance with FMVSS 209 and spooled out approximately 22 inches, allowing Christie to strike the top of the windshield header with his eyes. Dr. Benedict opines that the retractor's design is inherently defective and unreasonably dangerous because the retractor will not lock up consistently. He further opines that this spooling-out is conducive to and consistent with inertial unlatching of the buckle because it reduces tension in the webbing and subsequently lowers the forces acting between the latch plate and the buckle. Dr. Benedict states that either the spooling-out or inertial unlatching alone could have caused Christie to become unrestrained, but that it is also likely that both conditions could have occurred and that these defects acting in combination with one another would have also caused Christie to become unrestrained. [Doc. 44 Ex. 3].

## **II. APPLICABLE LAW: ADMISSIBILITY OF EXPERT TESTIMONY**

Mazda challenges Dr. Benedict's opinions under Rule 702 of the Federal Rules of Evidence and Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993).<sup>1</sup> Rule 702 of the Federal Rules of Evidence governs the admissibility of expert testimony:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and

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<sup>1</sup>Mazda does not dispute Dr. Benedict's qualifications to testify with respect to the issues of occupant protection systems or restraint systems.

methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

The trial judge must act as a gatekeeper, admitting only that expert testimony that is relevant and reliable. Daubert, 509 U.S. at 589. With regard to scientific knowledge, the trial court must initially determine whether the reasoning or methodology used is scientifically valid and is properly applied to the facts at issue in the trial. Id. at 590. To aid the trial court in this gatekeeping role, the Supreme Court has listed several key considerations: (1) whether the scientific knowledge can or has been tested; (2) whether the given theory or technique has been published or been the subject of peer review; (3) whether a known error rate exists; and (4) whether the theory enjoys general acceptance in the particular field. Id. at 592-94. The Court's focus "must be solely on principles and methodology, not on the conclusions that they generate." Id. at 595. "[T]he test under Daubert is not the correctness of the expert's conclusions but the soundness of his methodology." Daubert v. Merrell Dow Pharmaceuticals, Inc., 43 F.3d 1311, 1318 (9th Cir. 1995).

Although Daubert centered around the admissibility of scientific expert opinions, the trial court's gatekeeping function applies to all expert testimony, including that based upon specialized or technical, as opposed to scientific, knowledge. Kumho Tire Co. v. Carmichael, 526 U.S. 137, 147-48 (1999); Berry v. City of Detroit, 25 F.3d 1342, 1350 (6th Cir. 1994). The trial court's objective "is to make certain that an expert, whether basing testimony upon professional studies or personal experience, employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field." Kumho Tire, 526 U.S. at 152. The trial judge enjoys broad discretion in determining whether the factors listed in Daubert reasonably measure reliability in a given case. Id. at 153. With this framework in mind, the Court will now address Mazda's motion.

### **III. ANALYSIS**

Mazda contends that Dr. Benedict's proposed testimony will not assist the trier of fact to determine a fact in issue because Dr. Benedict admitted in his deposition that he could not determine whether Christie's injuries were caused by seat belt spool-out or by inertial unlatching of the buckle or by both. Mazda further argues that Dr. Benedict's proposed testimony and conclusions are fundamentally flawed because they are not based on principles of the scientific method. Specifically, Mazda claims that Dr. Benedict's methodology does not support his conclusion that the seat belt buckle inertially unlatched, as Dr. Benedict has provided no mathematical calculations that can be reproduced to establish that sufficient vertical G-forces were imparted on the seat belt buckle to cause inertial unlatching. Further, Mazda claims that Dr. Benedict's methodology does not support his conclusion that spool-out of the seat belt webbing caused plaintiff's injuries because Dr. Benedict failed to use any scientific methodology to establish how much spool-out actually took place. Finally, Mazda claims that Dr. Benedict's conclusions regarding the hood and the airbag are not supported by any evidence in this case. [Docs. 45, 67].

Christie opposes Mazda's motion, arguing that Dr. Benedict's opinions are grounded in fact and in the proper application of recognized and accepted scientific methodology. Accordingly, Christie argues, Dr. Benedict's testimony should be admitted and that the weight to be given his opinions should be determined by the jury. [Doc. 64].

#### **A. Causation Theories**

Mazda argues that Dr. Benedict's proposed testimony will not assist the trier of fact to determine a fact in issue. Specifically, Mazda argues that Dr. Benedict admitted in his deposition

that he could not determine whether Christie's injuries were caused by seat belt spool-out or by inertial unlatching of the seat belt buckle:

Q. Do you believe – which one do you believe happened in this accident or do you believe both happened in this accident?

A. Let me put it this way. If [the seat belt] was hooked up still, then it just spooled out. If it was retracted and off of him, or loose, as Mr. Lovely might have supposed in his testimony, then it became unlatched.

But in terms of the spool out and what have you, he has to spool out or unlatch to allow him to go forward. But if it unlatches and it's still on him, then it still had to spool out on top of it; otherwise it would have jerked it off of him – it, the latch plate and everything – and it would have retracted himself.

So there is no way to tell one way or the other whether one or both of them, either one or both of them happened.

Q. But you are certain that at least one or both of those occurred, spool out and inertial release?

A. Either one or both of them, yes.

[Benedict Dep. at 91-92]. Mazda contends that this deposition testimony illustrates that Dr. Benedict cannot determine the defect that allegedly caused Christie's injuries, and therefore, his testimony will not assist the trier of fact to determine a fact in issue.

In response to this argument, Christie argues that Daubert does not require an expert to eliminate all causes of the alleged injury, nor does it require absolute certainty of result or unanimity of scientific opinion before an expert's opinion is admissible. [Doc. 64].

The Court agrees with Christie that Dr. Benedict's opinions are not rendered inadmissible simply because he does not eliminate all possible causes of Christie's injuries. "The fact that several possible causes might remain 'uneliminated' . . . only goes to the accuracy of the

conclusion, not to the soundness of the methodology.” Jahn v. Equine Services, PSC, 233 F.3d 382, 390 (6th Cir 2000) (quoting Ambrosini v. Labarraque, 101 F.3d 129, 140 (D.C. Cir. 1996)). In his deposition, Dr. Benedict poses three alternative theories of causation with regard to the failure of the seat belt restraint system: he states that Christie’s injuries were caused by either inertial unlatching, seat belt spool-out, or a combination of these two occurrences.

The need for these alternative theories arises because one of the most significant factual disputes in the case is whether Christie was in fact wearing a seat belt at the time of the collision. Mazda claims that Christie was not restrained prior to this collision. Christie, on the other hand, claims that he was restrained prior to the accident but became unrestrained during the accident.

Dr. Benedict explained in his deposition that he excluded the possibility that Christie was not wearing a seat belt because there was “evidence that the thing did spool out some because there is some burn evidence on the D-ring and latch plate.” [Benedict Dep. at 92]. Mazda, of course, disputes this evidence, and it is far from a forgone conclusion that Christie was belted prior to the accident. It appears, at least from the opinions offered by Dr. Benedict, that Christie suffered injuries that are indicative of an unrestrained occupant. Whether these injuries occurred because Christie was not wearing a seat belt at the time of the collision or because he was wearing a seat belt but the seat belt failed is ultimately an issue for the jury in this case.

Even assuming that the seat belt was in use prior to the collision, the factual evidence as to whether the seat belt was still engaged at the time that the EMT personnel removed Christie from the car is unclear. EMT Lovely testified that he believed there was a seat belt restraining Christie, but that he could not remember whether the belt buckle was still latched or if the belt was

just hooked around Christie's clothing, nor could he remember whether the release button on the buckle had to be pushed in order to free Christie from the belt in order to remove him from the vehicle. In light of this testimony, Dr. Benedict testified as follows:

A. When we first looked at it, it was my opinion based on the fact that he was wearing the belt and there is evidence that it spooled out some on the D-ring and on the latch plate itself; it was my initial opinion, given all of that, that it came inertially unlatched because it will inertially unlatch in an accident of this type. That's number one.

But considering the fact that Mr. Lovely says it was still connected, then if that is the case, and nobody really knows, not even him – it's his belief based upon what he can recollect that certain things were certain ways – but if it was still connected, then it had to spool out. That is all.

And it could be either one or the other or both. That's why what I said in the supplemental report about it could be one or the other or both, because they both can happen.

[Benedict Dep. at 90-91].

Given Lovely's testimony (as well as other evidence in the record), a classic jury question is presented as to whether Christie was wearing a seat belt and, if so, whether the seat belt was still latched after the collision. The mere fact that such factual disputes exist, however, does not render Dr. Benedict's alternative causation theories inadmissible as unhelpful to the trier of fact. Indeed, as Dr. Benedict explains in his supplemental report, it is his opinion that inertial unlatching or spool-out (or a combination of these two conditions) could have occurred in this case and contributed to Christie's injuries. Whether one condition or the other or both (or neither) occurred is a question for the jury to decide.

For these reasons, the Court finds that Mazda's argument that Dr. Benedict's opinions will not assist the trier of fact to be without merit.



## **B. Inertial Unlatching**

In his initial report, Dr. Benedict stated the following opinions with respect to inertial unlatching:

10. The restraint system is inherently defective and unreasonably dangerous for its intended use and foreseeable misuse in that it failed to properly restrain Mr. Christie and prevent him from striking his head on the interior compartments of the vehicle in this accident.

11. The buckle inertially unlatched during this collision.

12. But for the failure of the buckle to remain connected during the collision, [Christie] would have remained unrestrained and he would not have impacted the windshield header.

[Doc. 44 Ex. 2]. In this report, Dr. Benedict set forth the materials that he reviewed in forming his opinions, including numerous NHTSA documents. According to Dr. Benedict, review of these materials revealed, among other things:

19. Witnesses stated that the rear of the Miata went up into the air upon impact;

20. Upward travel of the rear of the vehicle applied relative vertical acceleration between the buckle and latchplate;

21. Certain levels of relative acceleration between the latch plate and buckle in end-release buckle systems causes the latch plate and internal buckle components to move in the opposite direction of the buckle, which motion depresses the release button of the buckle to the point that the latch plate inertially release from the buckle locking mechanism;

\* \* \*

23. During tests conducted at Benedict Engineering Company, the passenger's buckle from Robert Christie's vehicle repeatedly unlatched due to inertial loading at accelerations rates of magnitude

and duration consistent with those experienced by vehicles and vehicle components in automobile collisions.

[Doc. 44 Ex. 2]. In his supplemental report [Doc. 44 Ex. 3], in which Dr. Benedict set forth his additional opinions regarding spool-out, Dr. Benedict noted that “spool-out is a condition conducive to and consistent with inertial unlatching of buckles because it reduces tension in the webbing and subsequently lowers the forces acting between the latch plate and the buckle, which when present, these forces may decrease the potential for the buckle to inertially unlatch depending on other factors.” [Id.]. Additionally, Dr. Benedict opines that “[t]he G-forces required to inertially unlatch a buckle are substantially less when the forces acting to pull the latch plate apart from the buckle are reduced due to little or no tension in the webbing.” [Id.].

In his deposition, Dr. Benedict described the testing that was performed in order to estimate the G-forces that were necessary to unlatch the seat belt in the collision. To perform the test, an accelerometer was attached to the stalk of the buckle, the stalk being the piece of metal that connects the buckle to the floor pan. [Benedict Dep. at 26]. The stalk and the attached accelerometer were then dropped from a drop tower, and the accelerometer calculated the G-forces imparted on the stalk as it collided with the surface beneath the drop tower. The minimum G-forces that unlatched the buckle was measured at 132 Gs. [Id.] at 26, 100].

Dr. Benedict testified in his deposition that he believes that the buckle in this case sustained a load of at least 132 Gs. [Id.] at 100]. He explained as follows:

Q. Do you believe that the buckle, the driver’s buckle, in the accident sustained a load of 132 Gs or greater?

A. Yes, because there is a magnification factor from the floor pan up, and that magnification factor is in the neighborhood of five to seven, if I remember my numbers right. So if the floor pan sees 26 Gs or

something like that, about 26 Gs, then it's enough to unlock the buckle.

And you are going to get 26 Gs with the car going up in the air the way they said it did and coming back down because it's going to accelerate upwards and then when it drops, the combination of the two. Because when it accelerates upward like the lady described it, it's got a fairly high acceleration going up, and when it drops back down on the pavement, it's going to unlatch, cause it to inertially unlatch, or could.

[Id. at 101]. Dr. Benedict admitted in his deposition that he has not calculated how many Gs were exerted upon the vehicle in the accident, and that in fact he could not make such a calculation without knowing the time duration, or pulse, of the collision. [Id. at 114]. Even if the pulse could be estimated, Dr. Benedict stated that he would only be able to calculate the average G-forces exerted on the vehicle, not the peak forces. [Id. at 115].

Dr. Benedict was then asked regarding the basis for his statement that the testing revealed that inertial latching occurred “at accelerations rates of magnitudes and duration consistent with those experienced by vehicles and vehicle components in automobile collisions.” Dr. Benedict testified that he relied upon NHTSA NCAP testing cited in his reports as support for his estimation of both the acceleration forces imparted on the vehicle in the collision as well as the magnification of those acceleration forces. [Id. at 116]. Specifically, he recalled one test involving a Toyota where the acceleration was measured at both the B-pillar and the floor pan. Dr. Benedict recalled that the acceleration rates on the floor pan accelerometer in that test were approximately 20 and 40 Gs. [Id. at 116]. While these tests measured acceleration rates in rollover crashes and not frontal barrier collisions, Dr. Benedict stated that the data was still relevant because either type of crash could result in a pulse of acceleration through the floor pan. [Id. at 117-18].

Dr. Benedict testified in his deposition that he believes that the inertial unlatching could have occurred either when the rear end of the vehicle came up upon impact or when the rear end of the vehicle came back down and landed on the ground:

Q. When do you believe that this buckle inertially released? Was it when the rear end of the car went up or was it when the rear end of the car came back down and landed back on the ground?

A. It could have been either way.

Q. And you can't say one way or the other which one it was?

A. More likely than not it was when it came back down.

Q. Because only if it occurred when it – when the car landed, again would you get this magnification factor from the floor pan up, correct?

A. That's correct.

Q. Because the magnification wouldn't have anything – there would be no magnification from the . . . floor pan up when the rear of the car is simply rising up into the air?

A. That's correct.

Q. Okay. If that's the case, then you wouldn't be able to get 132 Gs on the buckle, would you, simply by the rear end of the car raising up?

A. It all depends on how rapidly it raises up and it very well may be able to get 132 Gs or maybe it's a little less than that because of what – it depends on the time duration of everything as much as it does the actual acceleration.

\* \* \*

Q. Okay. If an inertial release occurred, it could have occurred either when the rear of the vehicle went upwards –

A. And during the frontal collision forces.

\* \* \*

Q. If the inertial release occurred with – during the accident, during the collision phase, it would have been because of the vertical acceleration of the rear end of the car rising up into the air?

A. Partly. It can be in combination with the rearward forces acting on the vehicle.

Q. By rearward forces you are talking about the force of the impact coming from the front?

A. Yes.

Q. The energy of the impact traveling from the front of the Mazda through the Mazda and into the rear of the Mazda?

A. That's right, because it can cause the floor pan to buckle and pulse during the frontal collision.

Q. And if the floor pan pulses or vibrates during the collision, how does that affect the relative acceleration of the body of the buckle and the button and latch?

A. If the floor pan pulses and you get a pulse wave under the floor pan, which you can do, it can cause an upward acceleration or force into the stalk. It's just like running over a road hump real fast; in terms of the equivalent types of accelerations is what I am saying, the methods of accelerating.

Q. Is there any way to calculate this magnification effect that you say happens?

A. No, that's been done experimentally.

[Benedict Dep. at 105-06; 110-12].

With respect to his failure to calculate the G-forces imparted on the vehicle, Dr.

Benedict explained in his affidavit that such a calculation was not possible:

Since the Miata and Mr. Christie himself were not outfitted with accelerometers during the collision, it is not possible for anyone to “measure the G-forces imparted to the vehicle, its restraint system

components, or to Mr. Christie himself in the collision. Moreover, the lack of data concerning the exact amount and rate of “rise” when the Miata lifted off of the pavement make it impossible for anyone to “calculate” the vertical acceleration or G-forces imparted to the seat belt components during the collision.

[Benedict Aff. ¶ 33]. Because the G-forces could not be measured, Dr. Benedict set out to estimate these forces based upon his review of various testing literature, particularly several NCAP and FMVSS compliance testing. For example, Dr. Benedict examined the FMVSS Compliance Testing in a 1991 Mazda Miata 30 mph frontal barrier crash (NHTSA No. CM5403, TRC Test No. 910320) and reached the following conclusion:

The rear end of the Mazda in the test video barely rose off the pavement. Even so, the data plot graph is on page B-4 of the test report, and shows vertical acceleration of 174 g’s for the driver dummy’s head. In the subject collision, there was a substantial rise of the Miata’s rear-end off of the pavement, according to two of the witnesses. Because the test dummy’s head and neck are flexible and compressible, they dampen the vertical accelerations they experience as measured by accelerometers. In contrast, the seat belt buckle stalk is stiff, rigid, and inflexible, and so the vertical accelerations imparted to the buckle by the collision would reasonably be expected to exceed those imparted to the dummy’s head and neck. This NCAP test report confirms my estimate that 132 g’s is well within the reasonably expected range of vertical G-forces imparted to the Miata driver’s side seat belt buckle in this collision, and is probably on the low side of what would be expected.

[Benedict Aff. ¶ 38].

Mazda contends Dr. Benedict’s methodology fails to support his conclusion about inertial latching. Specifically, Mazda argues, Dr. Benedict’s methodology is flawed because he: (1) failed to calculate the actual number of Gs imparted on the vehicle during the accident; (2) failed to establish how those uncalculated G-forces were magnified; (3) failed to establish how the G-forces imparted by the collision and traveling rearward through the floor plan were redirected

upward to the buckle; and (4) failed to establish that the buckle itself actually received a vertical force of 132 Gs.

Upon careful review of Dr. Benedict's original and supplemental reports, his deposition testimony, his subsequent affidavit testimony, and his testimony during the Daubert hearing, the Court finds that Dr. Benedict has demonstrated that the methodology underlying his opinions regarding inertial unlatching are the products of the application of reliable principles and methods. Dr. Benedict began his analysis by conducting testing on an exemplar seat belt buckle in order to determine the minimum level of G-forces required for inertial unlatching to occur. While Dr. Benedict admittedly did not calculate the G-forces imparted on the vehicle as a result of this collision, he explained that such a calculation simply was not possible under the circumstances. Instead, he used data obtained from NHTSA NCAP crash testing in order to approximate the acceleration forces as well as the magnification forces imparted on the vehicle.<sup>2</sup> Based upon this data, Dr. Benedict concluded that the forces involved in the collision in the present case were more than sufficient to create the minimum amount of force required for inertial unlatching to occur, and he has adequately explained the basis for his conclusion that these forces were imparted to the seat belt buckle as a result of the collision.<sup>3</sup>

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<sup>2</sup>Dr. Benedict also cited certain "literature" that was marked as exhibits to his deposition (without specifying further the literature to which he referred) in support of his estimates of the acceleration and magnification forces imparted on the vehicle in this accident. [Benedict Dep. at 118]. At the Daubert hearing, he testified that "[t]he magnification factor is a well-proven factor from tests and data that's been gathered by three or four other people and published." [Benedict Daubert Testimony at 88]. Later, he specifically referenced articles written by David Renfroe, which were attached to his deposition and affidavit, in support of his calculations of these forces. [Id. at 146].

<sup>3</sup>Mazda argues that the NHTSA crash testing (which was Exhibit 17 to Dr. Benedict's deposition and was introduced at this Daubert hearing) relied upon by Dr. Benedict does not

Dr. Benedict stated in his deposition that inertial unlatching could have occurred when the rear end of the vehicle went up in the air or when the rear end came back down and landed on the ground. He further opined that the inertial unlatching more likely than not occurred when the vehicle came back down, and he admitted that if that was the case, then Christie was more likely than not already injured (by impacting the windshield header) when the inertial latching occurred. [Benedict Dep. at 114]. This concession, while admittedly not beneficial to the plaintiff's case, does not in the Court's view render Dr. Benedict's opinions unreliable or otherwise admissible. Rather, it goes to the weight of his opinions on this issue, and provides fodder for cross-examination by the defendants. The Court finds that Mazda has not shown, through contrary expert evidence or otherwise, that Dr. Benedict's methodology in arriving at his conclusions is flawed or otherwise unreliable. Accordingly, the Court will not exclude his testimony on this basis.

### **C. Spool Out**

On November 15, 2005, Dr. Benedict issued a supplemental report to address the testimony of EMT worker Carver Lovely, who testified that there may have been a seat belt restraining Christie after the collision. Based upon this new information, Dr. Benedict conducted additional testing to determine whether the seat belt spooled out upon impact. The first test

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support his conclusions regarding vertical acceleration because the maximum acceleration reported in this testing was 116 Gs, and the figure of 174 Gs is never mentioned. Dr. Benedict explained in both his supplemental affidavit and at the Daubert hearing, however, that the figure of 174 Gs was an estimate of actual positive vertical acceleration measured by the accelerometers, which recorded a negative 116.01 Gs of vertical acceleration followed by a vertical spike from negative 116.01 Gs to positive 54.57 Gs. Referencing the graph in Exhibit 17 to his deposition, Dr. Benedict explained at the Daubert hearing that the actual positive acceleration measured was thus 170.58 Gs, and the variation between this figure and his estimate of 170 Gs is insignificant because it is still far more than the 132 Gs required for inertial unlatching to occur. [Doc. 69].



performed was on exemplar retractors and revealed that the retractor locked “sporadically” as it was continuously rotated through a 360-degree rotation at various speeds and that the webbing regularly spooled off the retractor reel when vertical upward accelerations occurred to the vehicle and thus the retractor. The second test performed was on the retractor involved in the subject collision. This test revealed that the retractor did not lock up until subjected to belt accelerations in excess of 4.0 Gs. Physical testing was also performed on the subject retractor, where the webbing was jerked in the direction of occupant motion during frontal collision. This testing revealed that the web-sensitive lock failed to stop spool-out on a regular basis. Finally, by placing an exemplar male in the driver’s seat of the subject vehicle, Dr. Benedict determined that Christie could have contacted the top of the windshield header with his eyes if the seat belt webbing spooled out 22 inches. [Doc. 44 Ex. 3].

Based upon this additional testing, as well as review of numerous peer-reviewed research articles and NHTSA crash data, Dr. Benedict opined as follows:

1. The retractor failed to lock in accordance with FMVSS 209 and spooled-out approximately 22 inches, allowing Mr. Christie to strike the top of the windshield header with his eyes.
2. The design of the retractor is inherently defective and unreasonably dangerous because it will not lock up consistently under foreseeable real world collision forces and those specified in section 209 of the Federal Motor Vehicle Safety Standard (FMVSS).

[Supplemental Report, Doc. 44 Ex. 3].

Mazda argues that Dr. Benedict’s opinions regarding seat belt spool-out are not based on scientific methodology and are not supported by the physical evidence in the case. Specifically, Mazda contends that Dr. Benedict’s conclusion that the seat belt spooled out 22 inches is simply based on the amount of spool-out that would be required to cause Christie’s injuries, not on any

examination of the retractor or seat belt. Further, Mazda argues that Dr. Benedict's conclusions are not supported by physical evidence, as there was no evidence of spool-out on the belt webbing itself. While Dr. Benedict relies on the fact that there is polishing on the latch plate of the buckle and the D-ring of the belt, Mazda argues that Dr. Benedict made no effort to determine whether this polishing was due to the collision or merely due to use of the seat belt during the life of the vehicle.

Contrary to Mazda's assertions, Dr. Benedict's opinion that the seat belt spooled out at least 22 inches is not based solely on the fact that this is the amount of spool-out required to cause injury. Dr. Benedict testified in his deposition that his conclusion was based upon the testing that he and his company performed. [Benedict Dep. at 49]. In performing these tests, Dr. Benedict noted that he was able to spool out over 22 inches by manually jerking the seat belt. [*Id.* at 49-50]. Thus, Dr. Benedict concluded, if the seat belt was still attached at the time of the collision (assuming that Christie was wearing it and further that it did not inertially unlatch), the seat belt spooled out and allowed Christie to come into contact with the windshield header.

Dr. Benedict also testified that his opinion regarding spool-out is supported by the physical evidence in the case. Specifically, he noted that there is "burn evidence" or "polishing" on the D-ring and latch plate. [Benedict Dep. at 92, 96]. He testified that he did not see any markings on the webbing consistent with spool-out, but he noted that webbing markings did not always occur and depended on whether the webbing was being loaded at the same time. [*Id.* at 95].

Upon reviewing Dr. Benedict's reports and deposition testimony, the Court cannot say that Dr. Benedict utilized an unreliable methodology or that his opinions are unsupported by the physical evidence in this case. Accordingly, the Court will not exclude Dr. Benedict's testimony on this basis.

**D. Airbag and Hood Defects**

In his initial report, Dr. Benedict made the following findings:

6. The Equivalent Barrier Speed (EBS) for the Miata from this collision was 30-31 MPH;
7. The hood of the Miata was pushed rearward and into the windshield;
8. The windshield was broken such that a large hole existed in the vicinity of the steering wheel;
9. The steering wheel is pushed forward approximately 4 inches and is touching the dash on the right side;
10. The hood of the Miata penetrated the windshield breaking it into glass fragments.
11. The airbag material is cut, torn and shredded;
12. The airbag has a depth of 8 ½ inches, a width of 21 ½ inches and a height of 21 inches when inflated;
13. The windshield header is deformed across an area approximately 6 inches wide just inboard of the driver's side A-pillar;
14. FMVSS 219 states that during a frontal barrier impact of 30 MPH, no part of the vehicle outside the occupant compartment shall penetrate the protected zone template to a depth of more than one-quarter inch . . . .

[Doc. 44 Ex. 2]. Based upon his findings, Dr. Benedict reached the following conclusions:

2. The Miata experienced an EBS of 30-31 MPH as a result of this collision.
3. The broken windshield pieces cut and destroyed the integrity of the airbag, ripping several holes in the bag and causing it to deflate quickly and to fail to absorb the impact of [Christie's] body as required by the [FMVSS] 208[.]

4. The structural integrity of the hood is inherently defective and unreasonably dangerous because it penetrated the windshield [sic] in violation of FMVSS 219.

5. The airbag is inherently defective and unreasonably dangerous for its intended use and foreseeable misuse in that it failed to protect Mr. Christie from the severe forces applied to his head as a result of impact.

6. The airbag was not designed to effectively attenuate the energy of occupant impact with the foreseeable points of contact, including the windshield header in this convertible vehicle.

7. Other, larger airbags are available that would have provided a greater energy absorption over a wider region and protection from occupant impact with the windshield header.

[Doc. 44 Ex. 2].

Mazda argues that Dr. Benedict's conclusions regarding the hood and the driver's airbag in the vehicle are not supported. First, Mazda argues that all of Dr. Benedict's defect opinions are premised upon the erroneous assumption that Christie was wearing his seat belt at the time of the accident. Because it cannot be established that Christie was wearing his seat belt, Mazda argues that Dr. Benedict's opinions regarding the hood and the airbag are superfluous. Mazda further contends that Dr. Benedict's opinion that the airbag and hood violated Federal Motor Vehicle Safety Standards are not relevant because the collision in this case did not fall within the limits established by those regulations. Moreover, Mazda argues, Dr. Benedict's opinions are "simply not legitimate science" and are not supported by any testing or any of the evidence in this case.

Contrary to Mazda's assertion, a review of Dr. Benedict's affidavit reveals that Dr. Benedict did not base his analysis solely on the premise that Christie was wearing his seat belt. Dr. Benedict noted in his affidavit [Doc. 55] that he conducted an analysis to determine the likely performance or failure of the airbag, assuming first that the seat belt was being worn at the

beginning of the collision sequence, and then assuming second that the seat belt was *not* being worn at the beginning of the collision sequence. [Benedict Aff. at ¶143(f)]. Dr. Benedict goes on to conclude that “[e]ven assuming Mr. Christie was not wearing his seat belt, a properly designed airbag adequately protected [from] cutting, ripping, and tearing caused by hood intrusion through the windshield should have prevented Mr. Christie from impacting the windshield header with his head and face if it met the FMVSS 208 S5 and S6 occupant protection requirements.” [Id. ¶160].

Mazda next argues that Dr. Benedict’s opinions that the airbag and hood violated Federal Motor Vehicle Safety Standards are not relevant because the collision in this case did not fall within the limits established by those regulations. Specifically, Mazda argues that the requirements of FMVSS 208 S5 and FMVSS 219 are not applicable because they are based upon a 30 mph collision into a fixed collision barrier. The subject accident, Mazda argues, did not involve a fixed barrier collision, and the equivalent barrier speed of this collision exceeded 30 mph.

The Court cannot say that the FMVSS are not applicable in this case. Dr. Benedict estimated the equivalent barrier speed of Christie’s vehicle to have been approximately 30-31 mph. [Benedict Dep. at 11; Doc. 44 Ex. 2]. In support of its argument that the subject collision is not similar to a fixed barrier collision, Mazda cites Dr. Benedict’s statement in his affidavit that Christie’s vehicle “underrode” the other vehicle at the left front wheel. [Benedict Aff. ¶ 22]. However, Dr. Benedict explains in his supplemental affidavit [Doc. 69], that the purpose of the 30 mph frontal and 30 degree angular barrier tests referenced by the FMVSS is to simulate a collision substantially similar to the one that occurred in the present case, and that any small variance in collision conditions from the FMVSS test parameters are “insignificant and immaterial.” [Doc. 69]. Moreover, Mazda has made no showing that the type of collision at issue in this case is not

contemplated by the requirements of the FMVSS. Whether the impact that occurred in this case is similar to a fixed barrier collision as contemplated by FMVSS 208 S5 or 219 is a factual dispute which is best left for resolution by the trier of fact. At this juncture, the Court cannot say that Dr. Benedict's opinions are unreliable or otherwise unsupported merely because he relies upon these regulations in reaching those opinions.

Finally, Mazda argues that Dr. Benedict's opinions regarding the airbag and hood are not supported by any testing or by the physical evidence in this case. The Court disagrees. Dr. Benedict described at length the physical evidence he relied upon in arriving at these opinions. As for Mazda's arguments with respect to the adequacy of Dr. Benedict's methodology and analysis, the Court finds that Mazda's arguments go more toward the proper weight to be afforded his testimony than the admissibility of such testimony.

#### **IV. CONCLUSION**

For the reasons set forth herein, Defendants' Motion in Limine to Exclude the Testimony of Plaintiff's Proposed Expert, Dr. Charles Benedict [Doc. 44] is **DENIED**.

**IT IS SO ORDERED.**

ENTER:

s/ C. Clifford Shirley, Jr.  
United States Magistrate Judge